ARTIMIS TELEPHONE TRAVEL INFORMATION SERVICE:
Current Use Patterns and User Satisfaction

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"Evaluation of ARTIMIS Telephone Information System"

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16. Abstract This report summarizes the results of a phone survey which evaluated the user satisfaction of the telephone traveler information service, ARTIMIS, in Cincinnati / Northern Kentucky. Information was also gathered on the users preference for a 3 versus 7 digit access number, use patterns, and user characteristics. The sample was obtained by intercepting calls to the service during Winter 1999. Users rated the service high. Common suggestions for improvements included longer hours of operation and coverage of more roads suggesting the service is valuable to its users. The travelers perceived that they benefited most by avoiding traffic problems, saving time, and reducing frustration. Of the 65% that would be willing to pay for the service, $0.25 was the average maximum payment they would be willing to make. The respondents had been using the service for an average of 13 months and made on average 4.3 calls per week. The 3 digit number, 211, was the most commonly used and recognized access number. Approximately 80 percent of individuals felt they would personally benefit from a nation-wide 3-digit number for travel information. Landline 211 calls result in an extra cost to operators of the system. Although these callers make less frequent calls, they are also more likely to make route or trip changes resulting in a public overall system benefit.

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EXECUTIVE SUMMARY

In February and March 1999, an ARTIMIS[1] Traffic Advisory Telephone Service (ARTIMIS TATS) user satisfaction survey was conducted by the University of Kentucky on behalf of the Kentucky Transportation Cabinet (KYTC) and the Ohio Department of Transportation (ODOT). The survey effort had three main objectives: 1) to assess the overall satisfaction and effectiveness of ARTIMIS TATS; 2) to determine the prevalence and preference of accessing the service through the use of a N11 dialing code; and 3) to determine the influence of the traveler information on travel behavior. A random telephone survey of households in the Cincinnati / Northern Kentucky area will be undertaken in the summer of 1999 to determine the general awareness and use of the service.

Users of ARTIMIS TATS were invited to participate in the satisfaction survey by intercepting their calls to the service. A total of 579 respondents were contacted by telephone within two to three weeks to complete the satisfaction questionnaire. Of the 1,110 calls that were intercepted to the service, 74 percent of calls had used the three-digit 211 number which is provided as an enhancement by the KYTC and ODOT. A majority of the calls intercepted, 64 percent, were made with a cellular phone.

The satisfaction survey revealed that a majority of users (62 percent) were male, while overall 74 percent of users had attended at least some college. Service user income levels were relatively high; two-thirds of respondents had a household income of more than $45,000 a year. Most respondents owned a cellular phone (88 percent). Furthermore, 63 percent of those who had been intercepted making a call from a landline phone, owned a cellular phone. Owners of cellular phones reported using the cellular phone for an average 78 percent of their calls to ARTIMIS TATS.

Several measures of service satisfaction were included in the survey. When directly asked, users rated the service an average of 8 on a scale of 1 to 10, with 10 being the best. The users also rated the service high for accuracy and ease of use. Over 99 percent of the users indicated they benefited from the service by avoiding traffic problems, saving time, reducing frustration or arriving on time. Most respondents are aware that ARTIMIS TATS, including the three-digit 211 number, are provided free of charge but are publicly funded. However, 65 percent indicated they would be willing to pay for the service, which also indicates a high level of satisfaction. On average, the maximum people would pay was $0.25. The finding that 81 percent of users had recommended the service to a friend was also taken as an indication that these users deemed the service of value and felt it would be of value to others. When asked for suggestions for service improvements 24 percent of individuals could not suggest one, while the most common suggestions involved extending the hours of the service or the routes covered by the service. This suggestion for "more" ARTIMIS TATS is also considered an indication of high satisfaction.

[1] Advanced Regional Traffic Interactive Management and Information System

The respondents indicated they had been using ARTIMIS for an average 13 months. The most common way people learned about the service was by radio or television. Radio was also the most common "other" source of traffic information used by the respondents. ARTIMIS TATS users indicated they call most often for information for work-related trips. They call most often from their vehicles. The average trip length for the most common trip when the users call the service was 22 miles. Users were asked what portion of the time the information provided by ARTIMIS TATS affected their travel behavior: route taken (average 71 percent of the time), departure time (average 34 percent of the time), and destination (average 25 percent of the time). The traffic information rarely affected mode used, however, users indicated on average 14 percent of the time they completely delayed their trip. These travel behavior changes have the potential for system-wide travel benefits for the area. Users indicated they called between once and 20 times per week (average 4.3). Over 50 percent of users call during the morning peak hours, while more, 80 percent, indicated they call during the afternoon/ evening peak. The majority of users indicate they are also frequently or occasionally motivated to call ARTIMIS TATS by bad weather, being late, road construction, and traffic crashes.

Each time someone dials 211 from a landline phone it costs ARTIMIS $0.25, while two major cellular phone service providers offer 211 free of charge to their customers. Over 70 percent of the respondents intercepted calling 211 on a landline phone owned a cellular phone. These 211 landline callers contact ARTIMIS TATS slightly less often, but are more likely to change their travel behavior, which can improve overall system performance. Among all users, the 211 number is the most used and recognized for the service. Approximately 80 percent of the users felt they would personally benefit from a nationwide N11 dialing code for traffic information so they would not need to know local access numbers.

The respondents indicated they make on average 19 trips per year to other areas where they could use a service like ARTIMIS TATS, but only 4.3 percent had ever used a service in another city. This potential use of telephone traffic information in multiple areas by the traveling public combined with the following three study findings suggests a nation-wide 3-digit access code for traffic information would be a benefit to overall transportation system performance. First, there is a high percentage of users who change their travel behavior due to real time traffic information provided by ARTIMIS TATS. Second, users were very satisfied with ARTIMIS TATS and many called for its expansion. Finally, there was good recall and preference for the 211 number currently provided in Northern Kentucky and Cincinnati by KYTC and ODOT.

1.0 BACKGROUND

The Advanced Regional Traffic Interactive Management and Information System (ARTIMIS) is a regional traffic management system provided by the Kentucky Transportation Cabinet (KYTC), Ohio Department of Transportation (ODOT), Federal Highway Administration (FHWA), Ohio-Kentucky-Indiana (OKI) Regional Council of Governments, and the City of Cincinnati. ARTIMIS has two major functions, specifically, Advanced Traffic Management Systems (ATMS) and Advanced Traveler Information Systems (ATIS). ARTIMIS serves the Cincinnati / Northern Kentucky urbanized area and a large volume of through traffic. In June 1995, ARTIMIS began a telephone information service as part of the ATIS function. This service, known as SmarTraveler, is but one component of the ATIS function and is hereinafter referred to as the ARTIMIS Traveler Advisory Telephone Service or ARTIMIS TATS. Three-digit numbers (211 and 311) were introduced to contact ARTIMIS TATS so callers would not have to remember or dial a seven-digit number. The 211 and 311 numbers are not a part of the SmarTraveler component but an enhancement provided by the KYTC and ODOT.

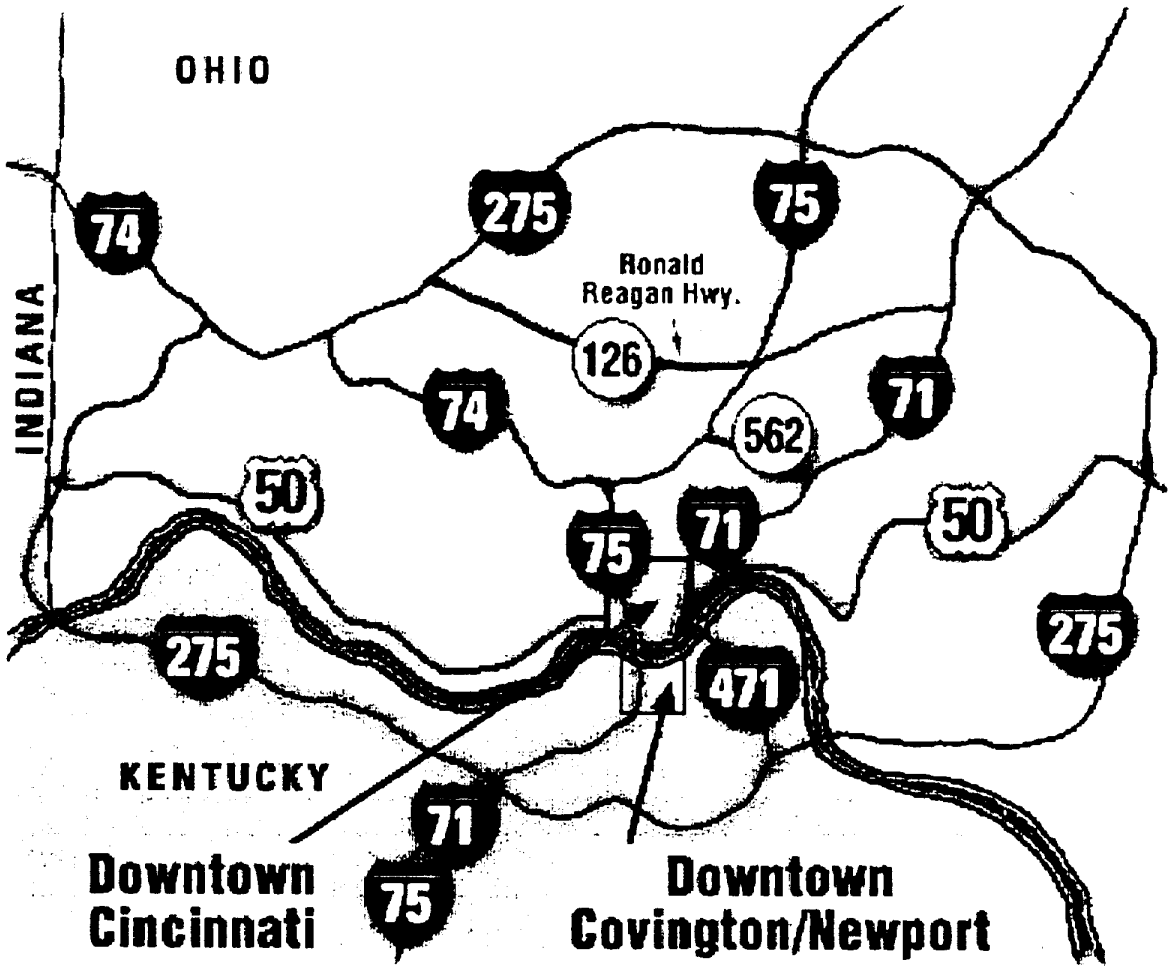
As it becomes more difficult to expand capacity to accommodate the increase in vehicle usage, ATIS services can alleviate many of the problems associated with traffic congestion in urban and rural areas. ATIS services, available in many cities in the United States, affect certain aspects of a person's travel behavior, such as route choice, departure time, decision to make the trip, or mode choice. These individual traveler changes can improve overall travel system performance by making travel less time consuming, more convenient and improving travel time for all system users. Travel information is available from several different sources, including radio, television, Internet, newspaper, telephone, changeable message signs, and route guidance provided by in-vehicle navigation systems. ARTIMIS TATS has become an important aspect of ATIS for the Cincinnati / Northern Kentucky area.

ARTIMIS TATS provides real-time traveler information to anyone in the local telephone service calling area who calls 211, 311[2], or 333-3333. Outside of the local calling area, travelers can dial (513) 333-3333 to reach the service. Callers can select a specific route or route segment from the system's main menu to receive a current report on traffic conditions. The routes covered by ARTIMIS TATS can be seen in Figure 1. The traffic reports are updated continuously from 6:00 a.m. to 7:00 p.m., Monday through Friday. Construction and transit information is available 24 hours a day, 7 days a week.

ARTIMIS uses many devices and sources to provide up-to-date traffic information. Devices include closed circuit video cameras, radar detectors, video imaging detectors, reference markers, and inductive loops. Other sources include freeway service patrols, one aircraft, a network of drivers who serve as probes, police, fire departments, emergency communicators, and construction personnel. ARTIMIS personnel are able to provide very comprehensive and accurate ATIS functions.

[2] Please note that although 311 is still available, since the local telephone service provider has not cut off the availability of that number, its promotion and advertisement has been discontinued.

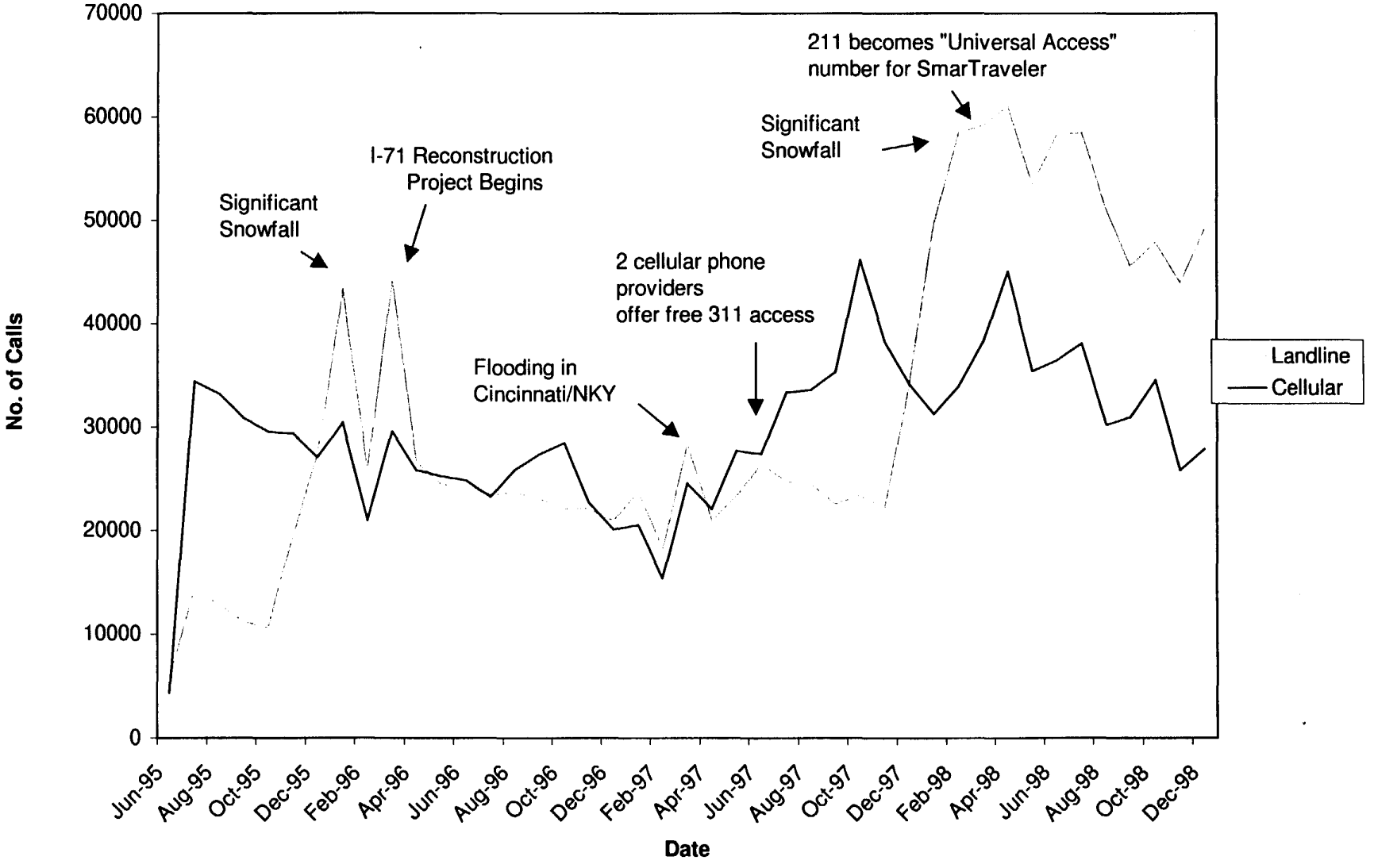
Figure 1: ARTIMIS TATS Route Coverage



ARTIMIS TATS is currently receiving over 80,000 calls per month. The calls are approximately 65 percent landline calls and 35 percent cellular telephone calls. However, the number of landline and cellular callers, shown in Figure 2, has fluctuated greatly throughout the life of the service. The patterns and peaks of Figure 2 will be discussed later. There is no cost to landline or most cellular phone users in the area, but out-of-the-area callers may incur long distance or roaming charges. The cost to ARTIMIS is about $0.25 per landline 211 call. There is no cost to ARTIMIS for a 333-3333 call. Four cellular providers currently waive airtime charges for 211 access for their customers. Two other cellular carriers are considering the same arrangement. Any cellular customer can dial 333-3333, but airtime charges will apply.

Initially, the seven-digit number, 333-3333, was used to access ARTIMIS TATS. In November 1995, callers in the Northern Kentucky portion of the area began to use 311, the first such usage in the nation for traveler information. However, in February 1997, the 311 number was reserved by the Federal Communications Commission (FCC) as a nationwide non-emergency public agency number. The 311 number is presently in use in several cities including Baltimore, San Jose, and Dallas. In order to avoid potential

Figure 2: Landline and Cellular Calls to ARTIMIS TATS



conflicts and implementation issues, the ARTIMIS project sponsors decided to seek another N11 dialing code. Subsequently in March of 1998, after action by the Kentucky Public Service Commission and the Public Utilities Commission of Ohio, the 211 number became available in the Cincinnati / Northern Kentucky area for travel information. Currently, the 211 number is operational in the major portion of the urbanized area of Cincinnati and in six counties in Kentucky. Ohio residents not in the local exchange carrier's (LEC) service area can only reach the service by calling the 333-3333 number.

On March 8, 1999, after the Federal Highway Administration (FHWA) had prepared a petition for a nationwide N11 dialing code, the United States Department of Transportation (USDOT) formally petitioned the FCC for the N11 dialing code that could be used to obtain traveler information across the United States. On April 13, 1999, an article in USA Today presented a valid, nationwide, case for an N11 dialing code. On April 20, 1999, the FCC issued a Public Notice on the USDOT petition, thereby formally beginning the regulatory process to consider the USDOT petition.

2.0 PROJECT OBJECTIVES

In 1998, in response to the federal interest in establishing N11 as a national traveler information number and a desire to evaluate the success and awareness of ARTIMIS TATS, the KYTC initiated a research project jointly funded by FHWA, KYTC, and ODOT. The benefits of a national N11 dialing code and the satisfaction and awareness of the traveler information number in Cincinnati / Northern Kentucky were to be assessed through surveying users of the system as well as a random sample of individuals in the area.

The following are the formal objectives that this project was created to meet:

- to assess the overall satisfaction and effectiveness of ARTIMIS TATS;
- to determine the general awareness of ARTIMIS TATS in the regional coverage area;
- to determine the prevalence and preference of accessing the service through the use of a N11 dialing code, such as 211, versus a seven-digit number; and
- to determine the influence of traveler information on travel behavior.

Specifically, research and survey questions were implemented to obtain the following information:

- relative number of calls from both cellular phone and landline users;
- perceived accuracy of the information received from the service;
- frequency of use;
- trip types (purpose) when using the service;
- change in route, departure time, or destination resulting from travel information;
- typical origins/destinations;
- preference for 3-digit versus 7-digit number;
- use of other sources of travel information;
- perceived benefits received from the service;

- motivations for service use;
- user satisfaction with the service;
- general public awareness of the service; and
- personal/demographic characteristics of the users and non-users.

All of this information is to be used, among other purposes, for KYTC and ODOT to determine if the cost of landline usage of 211 versus a seven-digit number is generating sufficient benefits to continue its usage.

In order to accomplish these objectives, two surveys were designed and undertaken. ARTIMIS TATS users were invited to participate in the first survey, by intercepting their calls into the system. At that time two brief questions were asked, however, the follow-up telephone satisfaction survey was completed within the next two weeks. The second survey, an awareness survey, was designed as a random-digit dial survey for people in the ARTIMIS coverage area.

This report includes an overview of the call history to ARTIMIS, the satisfaction survey methodology, the satisfaction surveys results, and conclusions on these results. Data from the second survey, the awareness survey, is not yet available.

3.0 CALL HISTORY

The number of calls coming from both landline and cellular phones to ARTIMIS TATS was analyzed from the beginning of the service's operation in June 1995, until December 1998. The analysis was performed in order to evaluate the effect of the number of calls (cellular and landline) into the service on road reconstruction, weather conditions, cellular phone charges to access ARTIMIS TATS, and radio and television broadcasts of the service. The call history used in the analysis was collected by ARTIMIS and provided to the University of Kentucky at the beginning of the study. At the time of the analysis, ARTIMIS had four telephone nodes coming into the service. There was a landline, Cellular Provider A[3], Cellular Provider B, and an overflow node. The landline node received calls from regular (non-cellular) phones. The Cellular Provider A and Cellular Provider B nodes only received calls from their respective cellular providers. The overflow node was used when a large number of calls entered the system. However, it also received calls from newer cellular providers as well as the overflow calls from the other nodes. ARTIMIS personnel estimated that 1.5 percent and 4.5 percent of calls going into this node were from Cellular Provider C and Cellular Provider D, respectively. This amount is taken away from the total number of calls into that node to find the estimated number of overflow calls from other sources, such as landline. The number of calls, cellular and landline, into the service fluctuated over the life of the service in response to many of the conditions mentioned previously.

Months experiencing bad weather had a greater than average number of calls to the service. There were very large accumulations of snow in January 1996 and February

[3] Here and throughout this report the cellular phone providers are referred to in this format to avoid advertisement or miscommunication of corporate policies.

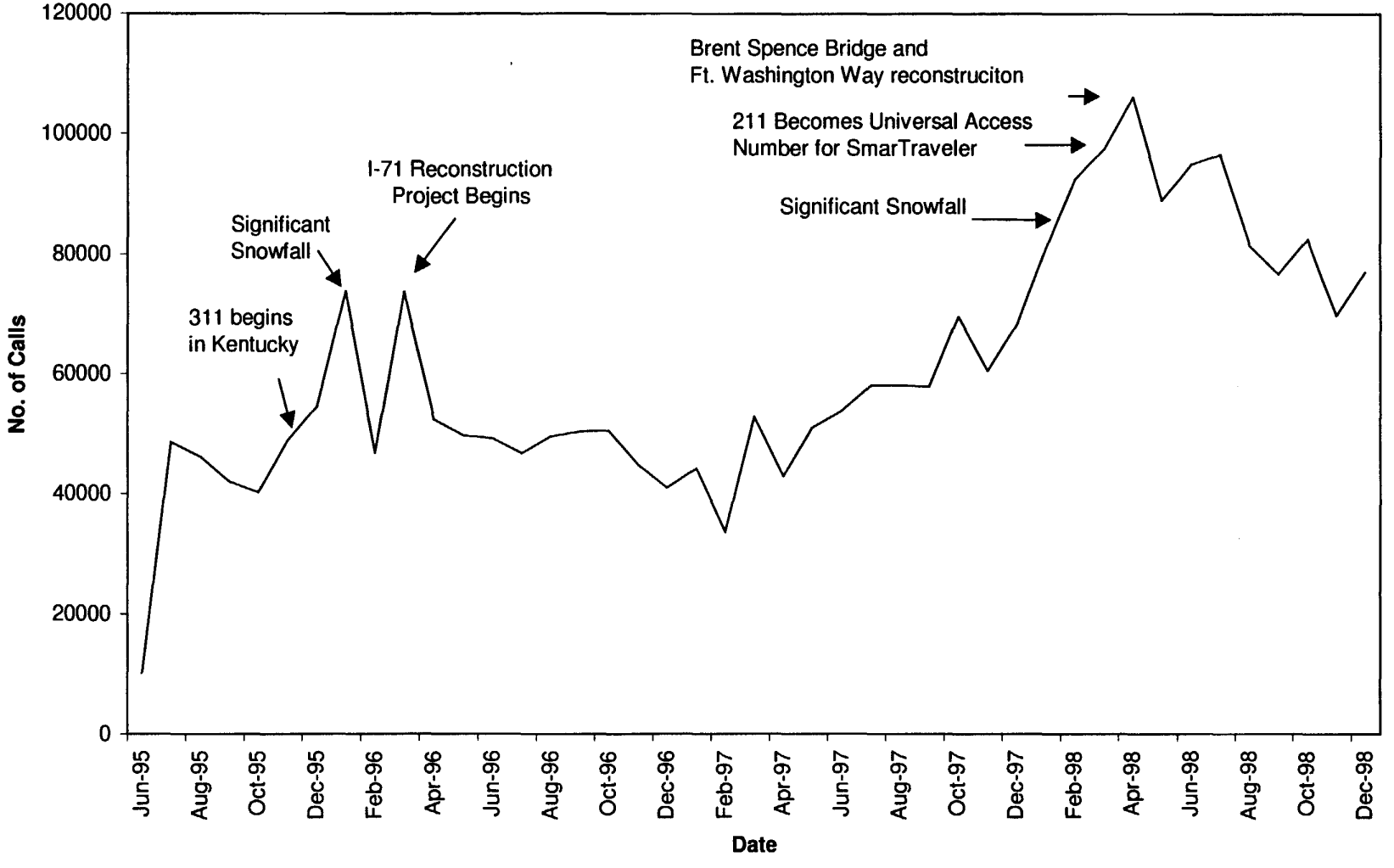
1998 that notably increased the calls into the service. Users of the service could call to determine the conditions of particular routes and to see if there were any incidents that might cause delays in travel time. Figure 2 indicates that call increases during these months were mostly from landline callers.

Roadway reconstruction is an on-going process in the ARTIMIS coverage area, as it is in most major U.S. urban areas. Roadway reconstruction can cause lengthy traffic delays that greatly increase the use of any ATIS service. In addition to real-time information, ARTIMIS TATS provides continuous information on roadway reconstruction 24 hours a day, 7 days a week for the convenience of the callers. Information that suggests that roadway reconstruction motivates calls to ARTIMIS can be viewed in Figure 3. A large increase in calls occurred in March 1996 when the reconstruction of I-71 began in the area. The largest number of calls per month (106,175 calls) was reported in April 1998, the month that reconstruction began on the Brent Spence Bridge and Fort Washington Way (I-71) in downtown Cincinnati.

In Figure 4, a definite trend can be followed for the Cellular Provider B calls which indicates cost also affects people's inclination to call ARTIMIS TATS. In September 1995, Cellular Provider B began charging customers airtime charges for calls to ARTIMIS via the 311 access number and calls to ARTIMIS decreased drastically. The calls leveled off in 1996 for about 8 months and then again decreased in number until Cellular Provider B stopped airtime charges for 311 access to ARTIMIS in May of 1997. Cellular Provider B calls increased by approximately 5000 calls per month in just a few months. This suggests that many ARTIMIS TATS users were not willing to pay for access to the service.

When ARTIMIS TATS first began, there were generally more cellular calls than landline calls (see Figure 5). The number of landline calls began to increase toward the end of 1995. This could have been spurred by WCPO-TV broadcasts that started in October 1995. Landline and cellular phone calls were almost equal again in the middle of 1996. Radio broadcasts of the service were aired in August 1996 and July 1997 which seem to have caused a slight and short-lived increase in the number of cellular phone calls. It appears that landline callers into the service were affected by the television broadcasts and cellular phone callers were affected by the radio broadcasts. Beginning in 1998, the percentage of landline calls greatly increased due to bad weather and major reconstruction projects including the reconstruction on Fort Washington Way, which led to significant press coverage of ARTIMIS TATS. But, as stated previously, the many peaks and changes in this graph suggest ARTIMIS TATS usage is a function of many variables.

Figure 3: Total ARTIMIS TATS Calls



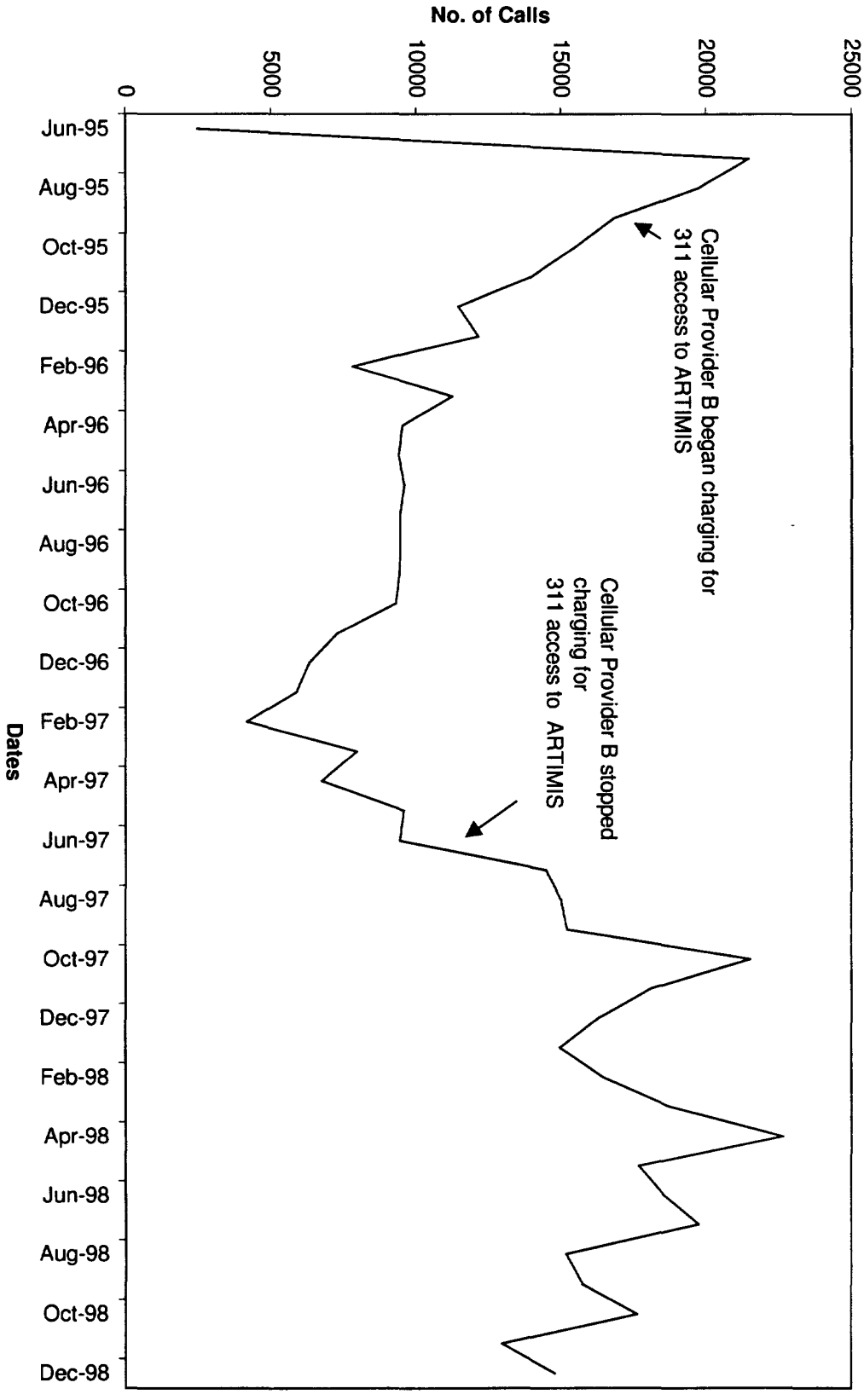


Figure 4: Cellular Provider B Cellular Calls

Figure 5: Affects of Radio and Television Broadcasts on Landline and Cellular Calls